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| 09/464,362 | 12/15/99 | KURITA | S 3790/USA/AKT |

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EXAMINER

MACARTHUR, S
ART UNIT PAPER NUMBER

1763
DATE MAILED:

04/11/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

FILE COPY

Office Action Summary

Application No.

09/464,362

Applicant(s)

KURITA ET AL.

Examiner

Sylvia R MacArthur

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 January 2001.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-97 is/are pending in the application.
- 4a) Of the above claim(s) 56-97 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-26, 33-37, and 43-55 is/are rejected.
- 7) ☒ Claim(s) 27-32 and 38-42 is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are objected to by the Examiner.
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

- 15) ☒ Notice of References Cited (PTO-892)
- 16) ☒ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 17) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 2.

- 18) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 19) ☐ Notice of Informal Patent Application (PTO-152)
- 20) ☐ Other:

DETAILED ACTION

Information Disclosure Statement

1. The pending applications listed in the PTO-1449 were not available for consideration at the time of this office action. They will be considered in the subsequent action.

Election/Restrictions

2. Applicant's election of claims 1-55 in Paper No. 4 is acknowledged. Because applicant did not distinctly and specifically point out the supposed errors in the restriction requirement, the election has been treated as an election without traverse (MPEP § 818.03(a)).

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

4. Claims 1-6,8-10, 13, 26, 33,34,36,46-51,53, and 54 rejected under 35 U.S.C. 102(e) as being anticipated by Edwards (USP 6,042,623).

Edwards discloses a two-wafer loadlock wafer processing apparatus and loading and unloading method. Two wafers are sequentially loaded into and simultaneously moved inbound to the high vacuum back end of the system, through one loadlock 12 and sequentially moved into and simultaneously moved outbound through the same loadlock, the loadlock having a pair of water cooled supports (both are cooling platens/plates) for simultaneously actively cooling the wafers.

The system 10 includes an elevator assembly 13 located with load lock chamber 12. A front door 14 for operator access to load and unload a multiple-wafer cassette 15 when the chamber 12 is at atmospheric pressure. The system also includes a vacuum transport chamber (transfer chamber) 17 that permits access for a robot arm. The elevator 13 positions the cassette 15 for access of the transfer arm 19 to a desired wafer 18 in the cassette 15. The carrier 25 includes a vertical array of horizontal wafer supporting rails 26 built into the carrier 25.

A single loadlock is spaced and horizontally oriented wafers. The transfer mechanism in the transfer module moves wafers individually between the loadlock and processing modules. The transfer mechanism in the front end module moves individual wafers between the one or more loadlocks and a plurality of multi-wafer carriers in an atmospheric pressure environment. A loadlock that is capable of operating as an outbound loadlock is also equipped with a cooling element to cool down the wafer, during the loadlock vent cycle, after the wafer has been processed, and before the wafer is loaded back into a carrier. The wafer placed in the loadlock is set on the tops on raised lift pins (first and second support structures), preferably on an upper one of two sets of pins, and the transfer arm is withdrawn from the loadlock chamber. Then a second wafer is removed from a carrier, and placed in the loadlock on the tops of a second set of raised lift pins, preferably on a lower one of the sets of pins, and the transfer arm is withdrawn from the loadlock chamber.

The two wafers have been processed, the wafers may then each be transferred from their final processing chamber used in the process to a loadlock, with the processed wafers being sequentially placed by the transfer arm of the high vacuum transfer chamber, each onto one set of the pins, whereupon the transfer arm is withdrawn from the loadlock, followed by the wafer

Art Unit: 1763

being moved vertically into a load lock chamber for outbound transfer as the chamber is sealed from the high vacuum atmosphere. The pins in the supports are then preferably lowered to set the wafer onto the support, whereupon, cooling tubes in the wafer support function.

In Figure 3, apparatus 30 includes a transfer chamber 33 and a number of process chambers 34. The transfer chamber 33 has a pivotal and radially extendable wafer transfer arm 35. The transfer arm moves the wafers to and from the load lock station 37.

The load lock 45 permits the passage of wafers two at a time. The wafers are spaced vertically on a wafer transfer support 48. Wafer supports 48a, 48b include an array of lift pins 59. The pins 59 of each support 48a, 48b can be selectively lowered and raised in synchronism to move a wafer to or from the surface of the supports. Elevator 56 is raised until the panel 57 seals the loadlock chamber.

To provide cooling to the wafer after processing, in col. 11 lines 18-40 Edwards cites that cooling is provided on each support. The upper surfaces of each support are provided with a water cooled wafer support plate. The plate is design with a plurality of three or more small elevated areas (grooves) 66. Cooling ports are provided in each support 48a, 48b of the support.

A robot places a carrier 25 that is loaded with a plurality of unprocessed wafers.

5. Claims 1,5,6, 11,12, 21, 22 and 50-55 are rejected under 35 U.S.C. 102(e) as being anticipated by White et al (USP 6,193,507).

White discloses multi-function chamber for a substrate processing system. The chamber can include a cooling platen with an upper cooling assembly. The upper cooling assembly is between a lid of the chamber and a substrate support mechanism. The platen is movable to lift a substrate positioned on the support mechanism to a cooling position below the upper cooling

Art Unit: 1763

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Art Unit: 1763

assembly, and to lower the substrate from the cooling position onto the support mechanism. The cooling platen can include multiple cooling tubes through which a cooling fluid can flow. The cooling platen can have an upper surface with a pattern of horizontal channels designed to control a contact area between the substrate and the cooling platen when the substrate is supported on the upper surface on the platen.

A gas delivery tube (gas inlet) can be attached to the load lock chamber 4. The stationary plate includes a series of vertical holes to allow a gas to be delivered from the delivery tube to an interior region of the chamber via the vertical holes. The upper cooling assembly can include a diffusion screen (filter) between the stationary plate and the substrate cooling position.

Resistive elements can be provided to heat the chamber body and the lid to maintain them within a specified temperature range. The device of White processes glass substrates. An atmospheric loading robot 12 with an end effector 14 can deliver substrates from the conveyor (external supply station) 10. The load lock chambers 4,8 perform a transition between atmospheric pressure and the pressure in the process chamber 6. The substrate support 38 is positioned between the upper and lower volume reducing elements 50A, 50B.

A substrate transfer and support mechanism 38 is disposed within the load lock chamber 30. The transfer and support mechanism 38 is used to transfer a substrate into and out of the load lock and can support the substrate within the chamber interior. The chamber includes a gas delivery pipe or tube 42 through which a gas can be delivered to the interior of the chamber 30. Inert gas like nitrogen or argon is provided to the chamber interior. The transfer mechanism 38 or the end effectors 14,18 of the robots 12, 16. The upper surface of the lower platen 84 includes a pattern of one or more horizontal grooves or channels 90.

The chamber 30 (Fig. 2) also can be configured as a cooling load lock chamber 30. The cooling configuration 30C includes a removable upper cooling assembly 86 and removable lower cooling platen 84.

The island 42 includes a substrate cooling load lock chamber 52 and at second end of the island, longitudinally opposite and downstream of the first end. A processing substrate may be cooled load lock chamber 52, which forms an exit load lock chamber. Introduction and removal of substrates to and from the load lock chambers 50 and 52 may be performed by robots 64A and 64B, respectively (see Fig. 1).

The support on which the substrate is placed is a platen 120. The platen 120 has slots where fingers of the shuttle move when transferring substrates 126 and has a plurality of channels 205. An elevator 53 may be used to move the multiple substrate cassette 51 in a vertical direction so that the substrate transfer shuttle may access successive substrates stored on shelves 55 within the cassette.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 7, 14-21, 35, 37, and 43-45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards or White in view Fairbairn (USP 6,152,070).

The teachings of Edwards and White were discussed above.

Art Unit: 1763

Both fail to teach that the cooling plate includes an anodized surface region.

Both fail to disclose two apertures provided in the load lock chamber for the loading and unloading of the wafers

Fairbairn teaches a load lock cassette that supports two or more wafers on cassette plates 222. These plates are made of anodized aluminum.

Load lock cassette 218 is disclosed within the load lock chamber 112. Each wafer seat 220 defines at least two grooves 226 in which a support rail 228 is disposed to support a wafer above the seat 220 to provide a cooling gas passage below the wafer. Transfer region 246 includes one or more passages 192 for providing access from the load lock chamber 112. Passages 210 and 221 are disposed in the sidewall 202 opposite the loading port 208 to allow wafers to be moved from the load lock chamber.

The motivation to provide anodized plates is to provide a chucking mechanism to enhance the support of the wafer onto the plate.

The motivation to provide more than one aperture for the load lock chamber is for ease of unloading and loading the wafers.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed invention to provide the load lock of Edwards or White with the anodized plates and plurality of transfer apertures of Fairbairn.

8. Claims 23-25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Edwards in view of White.

The teachings of Edwards were discussed above.

Edwards fails to teach a heater above the first support.

Art Unit: 1763

The teachings of White were discussed above.

The motivation to provide the apparatus of Edwards with the heating elements of White is to ensure uniform heat transfer of the wafers upon loading/unloading the wafers. This will decrease the time needed for pre-heating of the unprocessed wafers and cooling of processed wafers in subsequent or prior chambers.

Thus, it would have been obvious for one of ordinary skill in the art at the time of the claimed to provide the apparatus of Edwards with the heating elements of White.

Allowable Subject Matter

9 Claims 27-32 and 38-42 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

10. The following is a statement of reasons for the indication of allowable subject matter:
The prior art of record does not teach nor fairly suggest a middle plate.

Conclusion

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sylvia R MacArthur whose telephone number is 703-306-5690.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory L. Mills can be reached on 703-308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are 703-305-3599 for regular communications and 703-305-3599 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Application/Control Number: 09/464,362

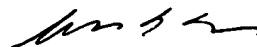
Page 9

Art Unit: 1763



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April 9, 2001



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